

WHAT IS CLAIMED IS:

1. An optical material which satisfies the following conditions:

$n_d > -6.667 \times 10^{-3} v_d + 1.70$ , where  $n_d$  is a refractive index with respect to a "d" line is  $n_d$  and an Abbe number with respect to the "d" line is  $v_d$ ; and the Abbe number  $v_d$  satisfies  $v_d \leq 16$ .

2. The optical material according to claim 1, wherein the optical material comprises at least one inorganic substance selected from the group consisting of  $TiO_2$ ,  $Nb_2O_5$ ,  $Cr_2O_3$ , and  $BaTiO_3$ .

3. The optical material according to claim 1, wherein the optical material comprises a polymer containing an inorganic fine particle.

4. The optical material according to claim 3, wherein the inorganic fine particle has a particle size of from 2 nm to 100 nm.

5. The optical material according to claim 4, wherein the polymer comprises polyvinylcarbazole, and wherein the inorganic fine particle comprises at least one selected from the group consisting of a  $TiO_2$  fine particle, an  $Nb_2O_5$  fine particle, a  $Cr_2O_3$

fine particle, and a BaTiO<sub>3</sub> fine particle.

6. The optical element comprising an optical material of claim 1, wherein the optical element is  
5 formed into a desirable shape by a curing reaction.

7. The optical element according to claim 6, wherein one surface of the optical element comprises a diffraction surface with a diffracting shape.

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8. A laminate type diffractive optical element comprising:

a first diffractive optical element; and  
a second diffractive optical element,

15 wherein one surface of the first diffractive optical element is a diffraction surface with a diffracting shape,

wherein the first diffractive optical element comprises an optical material in which:

20  $n_d > -6.667 \times 10^{-3} v_d + 1.70$ , where a refraction index with respect to a "d" line is  $n_d$  and an Abbe number with respect to the "d" line is  $v_d$ ; and

the Abbe number  $v_d$  satisfies  $v_d \leq 16$ ,

wherein the second diffractive optical element  
25 has the Abbe number larger than that of the first diffractive optical element, and

wherein one surface of the second diffractive

optical element is a diffraction surface with a diffracting shape, the diffraction surface being disposed such that the diffraction surface of the first diffractive optical element and the diffraction  
5 surface of the second diffractive optical element are opposed to each other.

9. The laminate type diffractive optical element according to claim 8, wherein the optical  
10 material forming the first diffractive optical element comprises at least one inorganic substance selected from the group consisting of  $\text{TiO}_2$ ,  $\text{Nb}_2\text{O}_5$ ,  $\text{Cr}_2\text{O}_3$ , and  $\text{BaTiO}_3$ .

15 10. A laminate type diffractive optical element according to claim 8, wherein the optical material forming the first diffractive optical element comprises a polymer containing an inorganic particle.

20 11. The laminate type diffractive optical element according to claim 10, wherein the inorganic fine particle has a particle size of from 2 nm to 100 nm.

25 12. The laminate type diffractive optical element according to claim 11,  
wherein the polymer comprises

polyvinylcarbazole, and

wherein the inorganic fine particle comprises  
at least one selected from the group consisting of a  
TiO<sub>2</sub> particle, an Nb<sub>2</sub>O<sub>5</sub> particle, a Cr<sub>2</sub>O<sub>3</sub> particle, and  
5 a BaTiO<sub>3</sub> particle.

13. A projection optical system for imaging a  
given object using a laminate type diffractive  
optical element of claim 8.

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14. A photographing optical system for  
projecting light to a given object using a laminate  
type diffractive optical element of claim 8.

15 15. A laminate type diffractive optical element  
comprising at least two layers, each layer comprising  
a different optical material, comprising:

a first layer; and

a second layer,

20 wherein one surface of the first layer is a  
diffraction surface with a diffracting shape,

wherein the first layer comprising a first  
optical material in which:

$n_d > -6.667 \times 10^{-3} v_d + 1.70$ , where  $n_d$  is a refractive

25 index with respect to a "d" line is  $n_d$  and an Abbe  
number with respect to the "d" line is  $v_d$ ; and

the Abbe number  $v_d$  satisfies  $v_d \leq 16$ ,

wherein the second layer is laminated on one of an upper side and a lower side of the first layer,

wherein one surface of the second layer is a diffraction surface with a diffracting shape, and

5        wherein the second layer has an Abbe number larger than that of the optical element forming the first layer.

16. The laminate type diffractive optical  
10    element according to claim 15, wherein the optical material forming the first layer comprises at least one inorganic substance selected from the group consisting of  $\text{TiO}_2$ ,  $\text{Nb}_2\text{O}_5$ ,  $\text{Cr}_2\text{O}_3$ , and  $\text{BaTiO}_3$ .

15        17. The laminate type diffractive optical element according to claim 15, wherein the optical material forming the first layer comprises a polymer containing an inorganic particle.

20        18. The laminate type diffractive optical element according to claim 17, wherein the inorganic fine particle has a particle size of from 2 nm to 100 nm.

25        19. The laminate type diffractive optical element according to claim 18,  
          wherein the polymer comprises

polyvinylcarbazole, and

wherein the inorganic fine particle comprises  
at least one selected from the group consisting of a  
TiO<sub>2</sub> particle, an Nb<sub>2</sub>O<sub>5</sub> particle, a Cr<sub>2</sub>O<sub>3</sub> particle, and  
5 a BaTiO<sub>3</sub> particle.

20. A projection optical system for imaging a  
given object using a laminate type diffractive  
optical element of claim 15.

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21. A photographing optical system for  
projecting light to a given object using a laminate  
type diffractive optical element of claim 15.

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